



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------------------|------------------------|
| 10/730,982 | 12/10/2003 | Atuhito Mochida | 2003_1798A | 5135 |
| 513 7590 08/29/2008 WENDEROTH, LIND & PONACK, L.L.P. 2033 K STREET N. W. SUITE 800 WASHINGTON, DC 20006-1021 | | | EXAMINER STONER, KILEY SHAWN | |
| | | | ART UNIT 1793 | PAPER NUMBER |
| | | | MAIL DATE 08/29/2008 | DELIVERY MODE PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/730,982

Applicant(s)

MOCHIDA ET AL.

Examiner

KILEY STONER

Art Unit

1793

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 5-20-08.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 18-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 18-25, 27-28 and 30-41 is/are rejected.
- 7) ☒ Claim(s) 26 and 29 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 35-40 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The disclosure does not provide explicit support for the limitation "wherein said collet has a contacting side having an outer edge portion all of which is position out of an outer edge portion of a contacting face of said semiconductor laser component". Thus, this limitation constitutes new matter. It should be noted that in the response filed on 5/20/08 the applicant failed to identify where support for this limitation can be found in the original disclosure.

Claim 36 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 36, line 2 the phrase "comprising the collect" is indefinite. It appears that the phrase should read --comprising heating the collet--.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 18-22, 24, 30, 32 and 34-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hawrylo (USPN 4576326) in view of Kurpiela (USPN 5579979).

Hawrylo teaches a method of mounting a semiconductor component by heating a bonding member (14) on a submount (12) on a heating table and positioning the component which is heated and pressed by a collet (thermoccompression tool) on the submount with pressure (figures 1, 4, col 1 lines 9-45, col 2 line 60 – col 3 line 27). The collet and table are heated to an appropriate temperature (col 4 lines 15-25) however the temperatures are not further disclosed. Neither is keeping heat from the heating table away of the collet or releasing the device before complete solidification.

It would have been obvious to one of ordinary skill in the art at the time of the invention to control heating of both the collet and table during each phase of bonding to prevent thermal damage to the devices. During placement heating both to the same temperature will prevent warping. As the heating table comprises a heatsink (12) most heat will stay below the collet and be drawn to the sink. It is unlikely that heat would flow upward to the collet when there is heatsink present and the tool has its own heat

source. By releasing the device prior to complete solidification the part can align itself without risk of damage due to collet pressure.

With respect to the limitation that "said collet has a contacting side having an area larger than that of a contacting portion of said semiconductor laser component" it is the examiner's position that Figures 1 and 2 of Kurpiela clearly depict a contact surface 5 that has a larger area than component 15. Note in Figure 1 how contact surface 5 in certain locations extends all the way to the housing 2. Furthermore, it is the examiner's position that at the time of the invention it would have been obvious to one of ordinary skill in the art to employ a collet having a contacting side with an area as large or larger than a contacting portion of said semiconductor laser component in order to insure an even force distribution over the surface of the component being bonded. As long as the area of the contacting surface of the collet is as large or larger than a contacting portion of said semiconductor laser component a uniform bond will be more readily formed.

With respect to claims 24 and 32, the examiner takes Official Notice that it is well known in the art to cool a bond with forced air. Thus, it is the examiner's position that the step of solidifying a portion of a bonding member with forced air would have been obvious to one of ordinary skill in the art. Decreasing the time required for solidification of the bonding member would increase the productivity of the process. In addition, removing heat from the bonding member with forced air would prevent the heat in the bonding member from thermally degrading the semiconductor laser device.

With respect to claim 35, Hawrylo teaches wherein said collet has a contacting side having an outer edge portion all of which is positioned out of an outer edge portion of a contacting face of said semiconductor component (Figures 1-4).

Claims 23, 25, 31 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hawrylo (USPN 4576326) and Kurpiela (USPN 5579979) as applied to claims 18, 22, 30 and 35 above, and further in view of Powers et al. (US 2004/0195297 A1).

Hawrylo teaches a method of mounting a semiconductor component by heating a bonding member (14) on a submount (12) on a heating table and positioning the component which is heated and pressed by a collet (thermoccompression tool) on the submount with pressure (figures 1, 4, col 1 lines 9-45, col 2 line 60 – col 3 line 27). The collet and table are heated to an appropriate temperature (col 4 lines 15-25).

However the bonding member is not further disclosed.

Powers teaches bonding a semiconductor component with a bonding material comprising at least two elements having different fusing points, including Au/Sn and In, wherein the component is held in place until solidified (paragraphs 10 and 19-21).

It would have been obvious to one of ordinary skill in the art at the time of the invention to make the bonding pads of a lead free solder with at least two metals with different fusing points or a material with a melting point less than eutectic solder to provide reliable, environmentally safe, bonds over a narrow temperature range thereby avoiding damage to the component and substrate.

Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hawrylo (USPN 4576326) and Kurpiela (USPN 5579979) in view of Powers et al. (US 2004/0195297 A1).

Hawrylo teaches a method of mounting a semiconductor component by heating a bonding member (14) on a submount (12) on a heating table and positioning the component which is heated and pressed by a collet (thermocompression tool) on the submount with pressure (figures 1, 4, col 1 lines 9-45, col 2 line 60 – col 3 line 27). The collet and table are heated to an appropriate temperature (col 4 lines 15-25).

However the bonding member is not further disclosed.

Powers teaches bonding a semiconductor component with a bonding material comprising at least two elements having different fusing points, including Au/Sn and In, wherein the component is held in place until solidified (paragraphs 10 and 19-21).

It would have been obvious to one of ordinary skill in the art at the time of the invention to make the bonding pads of a lead free solder with at least two metals with different fusing points or a material with a melting point less than eutectic solder to provide reliable, environmentally safe, bonds over a narrow temperature range thereby avoiding damage to the component and substrate.

With respect to the limitation that "said collet has a contacting side having an area larger than that of a contacting portion of said semiconductor laser component" it is the examiner's position that Figures 1 and 2 of Kurpiela clearly depict a contact surface 5 that has a larger area than component 15. Note in Figure 1 how contact surface 5 in

certain locations extends all the way to the housing 2. Furthermore, it is the examiner's position that at the time of the invention it would have been obvious to one of ordinary skill in the art to employ a collet having a contacting side with an area as large or larger than a contacting portion of said semiconductor laser component in order to insure an even force distribution over the surface of the component being bonded. As long as the area of the contacting surface of the collet is as large or larger than a contacting portion of said semiconductor laser component a uniform bond will be more readily formed.

Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hawrylo (USPN 4576326) as applied to claim 18 above, and further in view of Laub et al. (USPN 3790738).

Hawrylo teaches a method of mounting a semiconductor component by heating a bonding member (14) on a submount (12) on a heating table and positioning the component which is heated and pressed by a collet (thermocompression tool) on the submount with pressure (figures 1, 4, col 1 lines 9-45, col 2 line 60 – col 3 line 27). The collet and table are heated to an appropriate temperature (col 4 lines 15-25).

However the collet material is not disclosed.

Laub teaches a semiconductor bonding method using a low conductivity collet (col 3 lines 35-59 and col 4 lines 5-35) with temperature control (col 7 line 58 – col 8 line 4).

It would have been obvious to one of ordinary skill in the art at the time of the invention to employ a low conductivity collet to prevent thermal damage to the devices.

Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hawrylo (USPN 4576326) in view of Kurpiela (USPN 5579979) and Imanishi et al. (US 6787391).

Hawrylo teaches a method of mounting a semiconductor component by heating a bonding member (14) on a submount (12) on a heating table and positioning the component which is heated and pressed by a collet (thermocompression tool) on the submount with pressure (figures 1, 4, col 1 lines 9-45, col 2 line 60 – col 3 line 27). The collet and table are heated to an appropriate temperature (col 4 lines 15-25) however the temperatures are not further disclosed. Neither is keeping heat from the heating table away of the collet or releasing the device before complete solidification.

It would have been obvious to one of ordinary skill in the art at the time of the invention to control heating of both the collet and table during each phase of bonding to prevent thermal damage to the devices. During placement heating both to the same temperature will prevent warping. As the heating table comprises a heatsink (12) most heat will stay below the collet and be drawn to the sink. It is unlikely that heat would flow upward to the collet when there is heatsink present and the tool has its own heat source. By releasing the device prior to complete solidification the part can align itself without risk of damage due to collet pressure.

With respect to the limitation that "said collet has a contacting side having an area larger than that of a contacting portion of said semiconductor laser component" it is the examiner's position that Figures 1 and 2 of Kurpiela clearly depict a contact surface

5 that has a larger area than component 15. Note in Figure 1 how contact surface 5 in certain locations extends all the way to the housing 2. Furthermore, it is the examiner's position that at the time of the invention it would have been obvious to one of ordinary skill in the art to employ a collet having a contacting side with an area as large or larger than a contacting portion of said semiconductor laser component in order to insure an even force distribution over the surface of the component being bonded. As long as the area of the contacting surface of the collet is as large or larger than a contacting portion of said semiconductor laser component a uniform bond will be more readily formed.

Imanishi et al. teach "[t]he wafer temperature control device 160 heats the circuit formation face 211a of the quartz semiconductor wafer 211 placed on the bonding stage 110, or cools the stage contact face 211b so as to keep the temperature difference in the warpage non-generation temperature range. The warpage non-generation temperature range is within approximately 20°C based on the result of the experiments." (column 16, lines 13-33). Thus, at the time of the invention it would have been obvious to one of ordinary skill in the art to heat the collet and the table up to the same temperature and cool the collet under the same temperature profile when the semiconductor device is cooled in order to prevent warpage of the semiconductor device.

Allowable Subject Matter

Claims 26 and 29 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments filed 5/20/08 have been fully considered but they are not persuasive.

The applicant argues that the contact surface of nozzle bottom 5 is not larger than the upper surface of the component 15 as clearly shown in Fig. 2 of Kurpiela. Note that the portions that extend all the way to the housing are not contact surfaces. The examiner respectfully disagrees with the applicant's position. Since the nozzle bottom 5 is a planar surface the examiner maintains the position that the portions that continuously extend to the housing 2 also constitute part of the contacting side. It should be noted that the claim merely requires "said collet has a contacting side having an area larger than that of a contacting portion of said semiconductor laser component". The entire surface 5 of Kurpiela meets this limitation. The examiner reminds the applicant that during patent examination, the pending claims must be "given the broadest reasonable interpretation." Applicant always has the opportunity to amend the claims during prosecution, and broad interpretation by the examiner reduces the possibility that the claim, once issued, will be interpreted more broadly than is justified. *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969).

The applicant also argues that in Kurpiela the edge of the contact surface conforms to the edge of the component 15 at the position where the outlet port 4 is provide. If the collet and semiconductor device are displaced in this type of configuration, warping of the semiconductor device will occur. The applicant has failed to provide evidence that this phenomenon will occur. In addition, this argument is not commensurate in scope with claim 18 since the claim merely requires "said collet has a contacting side having an area larger than that of a contacting portion of said semiconductor laser component". Furthermore, the applicant's argument with respect to the positioning of the component is not persuasive because the contacting side of the collet only has to have an area larger than that of a contacting portion of said semiconductor.

In the non-final Office action mailed on 1/15/08 the examiner reinforced the obviousness rejection of claim 18 over Hawrylo in view of Kurpiela by stating that:

"It is the examiner's position that at the time of the invention it would have been obvious to one of ordinary skill in the art to employ a collet having a contacting side with an area as large or larger than a contacting portion of said semiconductor laser component in order to insure an even force distribution over the surface of the component being bonded. As long as the area of the contacting surface of the collet is as large or larger than a contacting portion of said semiconductor laser component a uniform bond will be more readily formed."

The applicant has failed to provide a persuasive argument with respect to the examiner's position. Instead, the applicant states that "[s]ince the prior art of record does not disclose or suggest this feature, the examiner is requested to site a reference supporting the stated position or provide an affidavit setting forth specific factual statement and explanation to support the position." It should be noted that the examiner

did not take Official Notice with respect to the examiner's position. The logic behind the examiner's position flows directly from basic principles of mechanics. If uniform force is not applied to the entire surface of the component being bonded then a uniform bond will not likely be formed. US 6,877,648 and US 3,533,155 teach using a contacting side of a bonding tool that has an area larger than the component being bonded in order to achieve a uniform bonding pressure that results in a uniform bond. The claim would have been obvious because a particular known technique was recognized as part of the ordinary capabilities of one skilled in the art. The claim would have been obvious because "a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense." In any event, the fact remains that Kurpiela teaches "said collet has a contacting side having an area larger than that of a contacting portion of said semiconductor laser component".

The applicant should also take note that the response received on 5/20/08 does not address the rejection of independent claims 24, 30 and 33.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kiley Stoner whose telephone number is 571-272-1183. The examiner can normally be reached Monday-Thursday (9:30 a.m. to 8:00 p.m.).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on 571-272-1223. The fax phone number for

the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kiley Stoner/
Primary Examiner, Art Unit 1793

